Remarks

The above Amendments and these Remarks are in reply to the Office Action mailed December 3, 2001.

The Examiner noted mis-numbered claims in the application as filed, beginning after original Claim 12. The mis-numbered claims have been re-numbered, making a total of 47 claims pending in this case. Dependent claims 15, 23, 24, 34, 36, 37 and 39-47 have been amended to correct dependency necessitated by the re-numbering of the claims.

The Examiner issued a restriction requirement, based upon the claims as re-numbered.

Applicants hereby elect Group I, Claims 1-25 and 29 - 30 without traverse, and withdraws Claims 26-28 and 31 - 47 without prejudice, being drawn to non-elected inventions. Applicants reserve the right to file continuing applications including the withdrawn claims.

The Commissioner is authorized to charge any underpayment or credit any overpayment to Deposit Account No. 06-1325 for any matter in connection with this response, including any fee for extension of time, which may be required.

Respectfully submitted,

Date: January 11, 2002

By: _____
D. Benjamin Borson, Ph.D.
Reg. No. 42,349

FLIESLER DUBB MEYER & LOVEJOY LLP
Four Embarcadero Center, Fourth Floor
San Francisco, California 94111-4156
Telephone: (415) 362-3800

APPENDIX

Marked up Copies of Renmmbered and Amended Claims

[11] 13. The method of claim 5, wherein the rf plasma power is about 750 Watts per 8 inch wafer.

[13] 14. The method of claim 7, wherein the rf plasma is generated in the presence of a noble gas.

[14] 15. (Amended) The method of claim [13] 14, wherein said noble gas is selected from the group consisting of helium, neon, argon, krypton and xenon.

[15] 16. The method of claim 7, wherein the pressure in the plasma chamber is in the range of about 100 milliTorr to about 50 Torr.

[16] 17. The method of claim 7, wherein the pressure in the plasma chamber is in the range of about 1 Torr to about 10 Torr.

[17] 18. The method of claim 7, wherein the pressure in the plasma chamber is about 4 Torr.

[18] 19. The method of claim 1, wherein the step of depositing a layer of doped dielectric material is carried out at a deposition temperature in the range of about 200° C to about 450° C.

[19] 20. The method of claim 1, wherein said doped dielectric layer is selected from the group consisting of fluorine doped silicate glass (FSG), phosphorous doped silicate glass (PSG), boron doped silicate glass (BSG), and boron phosphorous doped silicate glass (BPSG).

[20] 21. The method of claim 2, wherein said metal nitride layer comprises a metal selected from the group consisting of aluminum, tantalum and titanium.

[21] 22. A method for reducing diffusion of dopant ions from a dielectric layer into a metal layer, comprising:

(a) depositing on said metal layer, a nitrogen rich metal nitride layer; and

(b) depositing a layer of doped dielectric material on said nitrogen rich metal nitride layer.

[22] 23. (Amended) The method of claim [21] 22, wherein said metal nitride layer is made using a radiofrequency (rf) method using at least one variable selected from (a) a hydrogen:nitrogen ratio in the range of about 0.1:1 to about 4:1, (b) an rf power in the range of about 100 Watts per 8 inch wafer to about 1000 Watts per 8 inch diameter wafer, (c) a pressure in the plasma chamber in the range of about 100 milliTorr to about 50 Torr, and (d) a deposition temperature in the range of about 200° C to about 450° C.

[23] 24. (Amended) The method of claim [21] 22, wherein the metal nitride is selected from the group consisting of aluminum nitride, titanium nitride, and tantalum nitride.

[24] 25. (Amended) A method for reducing diffusion of dopant ions from a dielectric layer into a metal layer, comprising:

(a) providing a substrate;

(b) depositing over said substrate, a metal layer from the group consisting of aluminum, titanium, tantalum and aluminum/tantalum;

(c) forming a metal nitride using a nitrogen rich plasma using at least one variable selected from the group consisting of:

(i) a hydrogen:nitrogen ratio in the range of about 0.1:1 to about 4:1;

(ii) an rf power in the range of about 100 Watts per 8 inch wafer to about 1000 Watts per 8 inch diameter wafer; and

(iii) a pressure in the plasma chamber in the range of about 100 milliTorr to about 50 Torr; and

(iv) a deposition temperature in the range of about 200° C to about 450° C; and

(d) depositing on said metal nitride layer, a layer of doped dielectric material selected from the group consisting of fluorine doped silicate glass (FSG), phosphorous doped silicate glass (PSG), boron doped silicate glass (BSG), and boron phosphorous doped silicate glass (BPSG).

[27] 29. The method of claim 2, wherein said barrier layer is formed using electromagnetic radiation.

[28] 30 The method of claim 2, wherein said barrier layer is formed using nitrogen ion implantation.